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## (54) AN INHALER FOR POWDERED MEDICAMENT

(71) We, **BESPAK INDUSTRIES LIMITED**, a British Company, of Fieldings Road, Cheshunt, Waltham Cross, Hertfordshire, EN8 9TX, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The invention relates to an inhaler for powdered medicaments and is particularly useful in applying powdered medicaments for the relief of respiratory ailments such as asthma.

15 Such inhalers are known, for example, from British Patent Specification No. 898649 (Benger Laboratories Ltd) which describes a device in which powdered medicaments entrained in a stream of air  
 20 under pressure, a valve being opened to allow the stream of air and medicament to be released from the device when a user inhales through a mouthpiece.

It is an object of this invention to  
 25 provide an improved inhaler of this type.

Accordingly the invention provides an inhaler for powdered medicaments comprising a housing having a chamber therein, a capsule containing a dose of the  
 30 medicament to be dispensed, said capsule being located in the chamber, a duct in the housing, one end of the duct being open to the atmosphere and the other end of the duct having its outlet in a mouth piece for  
 35 insertion into the mouth of a user, a passage connecting the chamber to the mouth piece, a manually operated pump for supplying air under pressure to the chamber, a flow sensor arranged in the duct, a valve  
 40 to prevent air under pressure and the medicament from entering the mouth piece, and means to operate the valve to allow air and medicament to enter the mouth  
 45 inhaling through the duct, in which inhaler

the valve is situated between the pump and the chamber, and the capsule and the chamber are so arranged and dimensioned that all the air supplied by the pump flows through the capsule when the valve is  
 50 opened.

An advantage of this arrangement is that a very high proportion of the medicament contained in the capsule is administered to the user during one actuation of the in-  
 55 haler.

In a preferred embodiment, the flow sensor comprises a vane mounted in the duct for pivotal movement and the valve is mounted on one end of the vane.  
 60

In this case, the vane may pivot about a fulcrum between the said end and the duct, and the fulcrum may be adjacent the valve.

Further, the valve may be spring urged  
 65 into the closed position.

An advantage of this preferred arrangement is that the user receives the dose of medicament at the correct point in the inspiratory cycle and this ensures that the in-  
 70haled drug is most efficiently utilised.

Preferably the capsule is placed in the chamber as a sealed capsule containing the medicament and there may be means to puncture the ends of the capsule.  
 75

The puncturing means may comprise a needle movable by a sliding member to pierce one end of the capsule.

There may be a cover for the mouth piece and the puncturing means may  
 80 further comprise a needle internally mounted on the cover to pierce the other end of the capsule.

A specific example of an inhaler according to the invention will now be described  
 85 with reference to the accompanying drawings in which:—

Figure 1 is a vertical section through the inhaler;

Figure 2 is a horizontal section taken on 90

the line 2-2 of Figure 1; and

Figure 3 is a plan view of the inhaler.

The inhaler comprises a housing 10 which is formed with a cylinder 11 having an inner end wall. A bellows 12 is mounted in the cylinder 11 and a non-return valve 13 is provided in the wall of the cylinder 11 to allow ingress of air to the bellows.

Within the housing, adjacent the end wall of the cylinder 11 there is formed a block 14 which is recessed to house one end of a capsule 15 containing the powdered medicament to be dispensed. The capsule is held in position by means of a retaining member 16 which has a corresponding recess and which is attached by spokes 35 to a mouthpiece 17 which screws on to the housing.

Air will flow from the cylinder 11 to the capsule 15 by means of a passage 18 in the block and then through an inlet passage 19 also in the block. A valve 20 is provided to close off the end of the passage 18 remote from the cylinder in a manner which will be described later.

In order to puncture the ends of the capsule 15 two needles 21 and 22 are provided. The needle 21 is formed as part of a cover 23 for the mouth piece and passes into the capsule through an outlet 24 from the capsule to the mouth piece. The needle 22 is mounted on a button 25 which is carried by a connecting arm 27 which passes through a slot 28 in the housing and is rigidly attached to a sliding member 29. The member 29 can be moved along the side of the housing to press the button 25 inwardly against a spring 26 in order to puncture the capsule.

The valve 20 is mounted on one end of a vane 30 pivoted about a fulcrum 31. A spring 32 is provided which biases the valve 20 to close the passageway 18 (Figure 1 shows the vane in solid lines in its position where the valve is open and in broken lines in its position where the valve is closed).

The vane 30 is situated in an air duct having its inlet in the region 33 in Figure 1 and having its outlet through the spaces round the retaining member 16 between the spokes 35 and leading into the mouth piece.

In order to operate the inhaler a capsule 15 is first placed in position and the two ends of the capsule are punctured, first using the needle 21 and then the needle 22. The cover 23 is then removed. Pressure is then applied to the top of the bellows 12 to provide a supply of air under pressure while the valve 20 is closed because of the action of the spring 32. When the user inhales air through the mouth piece 17 flow of air through the duct from the region 33

to the mouth piece moves the vane 30 into the position shown in solid lines in Figure 1 thus releasing the air under pressure to flow through the capsule 15 and out into the mouth piece taking with it the medicament in the capsule. In this way a thorough purge of the capsule is ensured and the dose of medicament is inhaled by the user. A typical result for the amount of medicament inhaled by the user is 91% of the medicament contained in the capsule.

#### WHAT WE CLAIM IS:—

1. An inhaler for powdered medicaments comprising a housing having a chamber therein, a capsule containing a dose of the medicament to be dispensed, said capsule being located in the chamber, a duct in the housing, one end of the duct being open to the atmosphere and the other end of the duct having its outlet in a mouth piece for insertion into the mouth of a user, a passage connecting the chamber to the mouth piece, a manually operated pump for supplying air under pressure to the chamber, a flow sensor arranged in the duct, a valve to prevent air under pressure and the medicament from entering the mouth piece, and means to operate the valve to allow air and medicament to enter the mouth piece when the flow sensor detects a user inhaling through the duct, in which inhaler the valve is situated between the pump and the chamber, and the capsule and the chamber are so arranged and dimensioned that all the air supplied by the pump flows through the capsule when the valve is opened.
2. An inhaler as claimed in claim 1 in which the flow sensor comprises a movable vane mounted in the duct.
3. An inhaler as claimed in claim 2 in which the vane is pivotally mounted and the valve is arranged on one end of the vane.
4. An inhaler as claimed in claim 3 in which the vane pivots about a fulcrum between the said end and the duct, the fulcrum being adjacent the valve.
5. An inhaler as claimed in any one of the preceding claims, in which the valve is spring urged into the closed position.
6. An inhaler as claimed in any one of the preceding claims in which the capsule is placed in the chamber as a sealed capsule containing the medicament and means are provided to puncture the ends of the capsule.
7. An inhaler as claimed in claim 6 in which the puncturing means comprises a needle movable by a sliding member mounted externally of the housing is provided to pierce one end of the capsule.

8. An inhaler as claimed in claim 7 in which a cover is provided for closing the mouth piece when not in use, and the puncturing means further comprises a  
5 needle internally mounted on the cover to pierce the other end of the capsule.

9. An inhaler for powdered

medicaments, substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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Fig. 1.

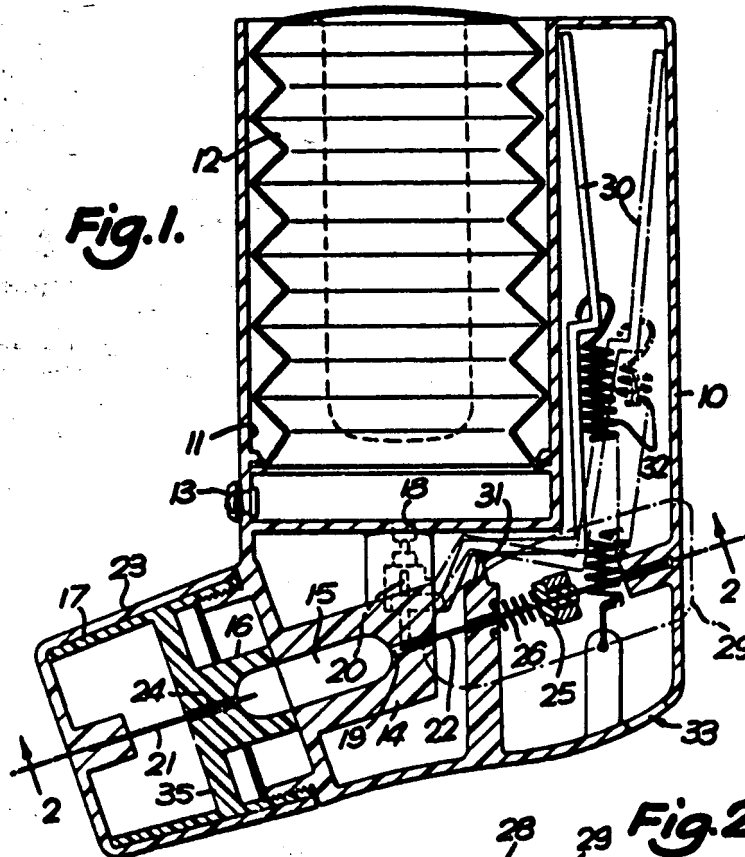


Fig. 2.

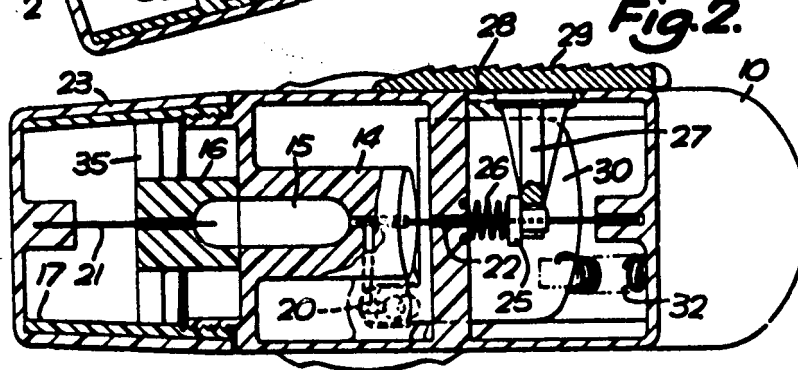
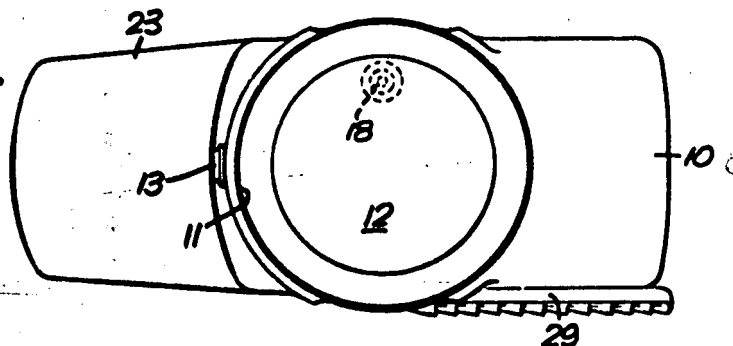


Fig. 3.





ВСЕСОЮЗНЫЙ  
НАУЧНО-ИССЛЕДОВАТЕЛЬСКИЙ ИНСТИТУТ  
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На No

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от

В ответе просим сослаться на номер заявки

ЗАПРОС  
патентной экспертизы

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(71) Заявитель(и) ГЛЭКСО ГРУП ЛИМИТЕД, GB

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Для обеспечения возможности дальнейшего рассмотрения заявки экспертиза предлагает заявителю представить материалы, документы, сведения в связи с поставленными вопросами, мнение относительно приведенных в запросе доводов, замечаний, предложений.

Ответ на запрос должен быть представлен в 2-х месячный срок с даты его получения (пункт 2 статьи 12 Закона СССР "Об изобретениях в СССР"). По просьбе заявителя, поступившей до истечения этого срока, он может быть продлен при условии оплаты в установленном порядке.

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заявка на изобретение считается отозванной.



экспертиза будет проведена в соответствии с пунктом 2 статьи 14 Закона.

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1439/Г